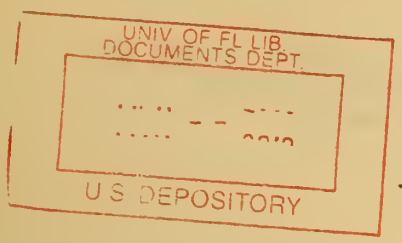
UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics
Division of Cotton Marketing



SAMPLING AMERICAN COTTON

Prevailing Practices and Some Factors Affecting Representativeness of Samples

By Sam W. Martin, Associate Agricultural Economist,
and Florena Cleaves, Junior Marketing Specialist

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Introduction

Reliable classification of cotton requires that samples be adequately representative of the bales from which they are drawn. The manner of drawing the sample and other factors affecting its representativeness deserve more consideration than they have received. The importance of a properly drawn sample is too little recognized either by the one who draws the sample or by those who handle it before it is used as the basis of classification. This report presents information assembled through a recent study of various methods of sampling cotton in the United States and of closely related practices insofar as they are associated with representativeness of the samples drawn.

It is known that disparities can and do occur in the classification of samples from the same bales of cotton by different classers. As presumably such disparities may be due in part to differences in samples, this study was made by the Bureau of Agricultural Economics to obtain information

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1/ This study was made under the direct supervision of W. B. Lanham, leader of the Grade and Staple Statistics Section of the Division of Cotton Marketing. Special credit is due to Arthur W. Palmer, formerly in charge of the Division of Cotton Marketing, who, in addition to general supervision, contributed helpful suggestions.

concerning the influence of different methods of sampling cotton and of closely associated practices on the representativeness of samples drawn. The study has furnished information also for use in making effective the provisions of Public Resolution 73, 72nd Congress, approved March 4, 1933, enacted "to authorize and direct the Secretary of Agriculture to provide additional facilities for the classification of cotton under the United States Cotton Futures Act."

The study was based on a survey of sampling methods employed in all of the cotton-producing States except Arizona, California, Florida, Kentucky, New Mexico, and Oklahoma. With the time and funds available, it was not possible to include these States in the survey, but there is no reason to suppose that sampling practices prevailing in these States differ sufficiently from those employed in other cotton-growing States to affect materially the usefulness of the information obtained.

Consideration was given not only to the different methods of drawing samples from cotton bales and the distinguishing characteristics of the different types of samples, but also to (a) ginning and baling practices that affect representativeness of samples, such as plating of bales at the gin, and (b) handling of samples after they are drawn, such as trimming, rolling, and packing. These factors have an important bearing upon the proper classification of cotton bales. It is possible that comparison of the different methods of sampling employed in the different parts of the country, and of handling and caring for them after they have been drawn, might lead to better and more uniform practices.

Procedure in Gathering Data

For the purpose of obtaining data regarding methods of sampling and related practices, 148 compresses and warehouses, 161 cotton buyers, and a large number of ginners were visited in various parts of the Cotton Belt. To obtain information on ginning practices affecting representativeness of samples, a number of gin-manufacturing companies, ginners, and the experimental cotton ginning laboratory of the United States Department of Agriculture at Stoneville, Miss., were also visited. The compresses and other establishments visited and the ginners and buyers interviewed were designated by officials in charge of the several field offices of the Grade and Staple Statistics Section of the Bureau as most likely to furnish a representative body of data. No attempt was made to provide for weighting the data obtained on the basis of cotton handled by the compressmen, warehousemen, buyers, and ginners interviewed as compared with total cotton compressed, stored, sold, or ginned in the various States. Care was taken, however, to include in the survey all types and sizes of agencies performing the services indicated. Inasmuch as a large part of the cotton handled in each State is represented by the agencies from whom information was obtained and in view of the comparatively narrow range in sampling practices within individual States, it seems unlikely that the results of the inquiry would have been materially different if a more comprehensive survey had been made.

Types of Cotton Samples

Different methods of drawing samples are employed in different parts of the Cotton Belt. Four more or less distinct sampling practices are here discussed, and the outstanding characteristics of the four resulting types of samples are set forth (figs. 1 to 8), namely, (1) the "plugged" sample, (2) the sample that is cut on one edge only, (3) the sample that is pulled from the bale with a cotton hook, and (4) the sample that is pulled from the bale by hand. 2/ As hereafter explained, in drawing samples numbered (1) and (2), the sampler cuts into the bale itself, whereas in drawing samples numbered (3) and (4), the bagging only is cut preparatory to drawing the sample. (Samples used as a basis of reports issued by the United States Department of Agriculture on grade and staple length of cotton ginned, are press-box samples taken from about the center of the bale before it is wrapped and tied. This study was limited to the four types of samples at present employed in the usual marketing practice.)

Plugged Sample.- When a flat, or uncompressed, bale of cotton is presented to the sampler for drawing a "plugged", or blocked, sample, he makes two smooth, straight cuts into the bale--about 16 inches long, 6 inches apart, and 2 inches deep (fig. 9). For making these cuts the sampler uses a very sharp knife, about 10 inches long, the curved cutting edge of which he keeps sharp by the frequent use of a carborundum rock or other substance suitable for whetting (fig. 10). An experienced sampler will make each cut at a single stroke, the two requiring about 6 seconds. Another stroke severs the bagging at one end, and the sample is then grasped firmly, usually in both hands, and pulled from the bale, care being taken to disturb the edges and the layers of fiber as little as possible. This sample is usually laid on the bale with the outside surface down, and another sample is similarly drawn from the other side of the bale. The same procedure is followed in drawing a plugged sample from a high-density or a standard-density bale except that the two smooth cuts are usually made from 3/4 inch to 1 inch deep and parallel to and very close to the inside edges of two adjacent bands. A sample drawn in this way is neat in appearance and very compact (figs. 1 and 2).

After the two portions of the sample have been drawn, it is customary to place an identifying coupon between them, and they are then rolled together and either wrapped in paper or placed in a basket, a box, or a sack.

Table 1 shows that the practice of sampling bales of cotton by plugging is employed in the States of Texas, Alabama, and Louisiana. At only 4.3 percent of the compresses and warehouses visited in Texas was this method of drawing samples employed exclusively, but it was employed to some extent at almost one-third of them and at more than one-tenth of the 148 compresses and warehouses visited in the United States. Although no means of weighting these data on the basis of volume of bales sampled is available, it was observed during the survey that plugging is the most popular method of sampling at several of the large cotton warehouses and compresses in Texas, and that the use of this method of sampling is increasing. It seems probable that considerably more than one-third of the Texas crop is so sampled.

2/ Samples from flat and compressed bales only. Samples are usually drawn from round bales with an augur.

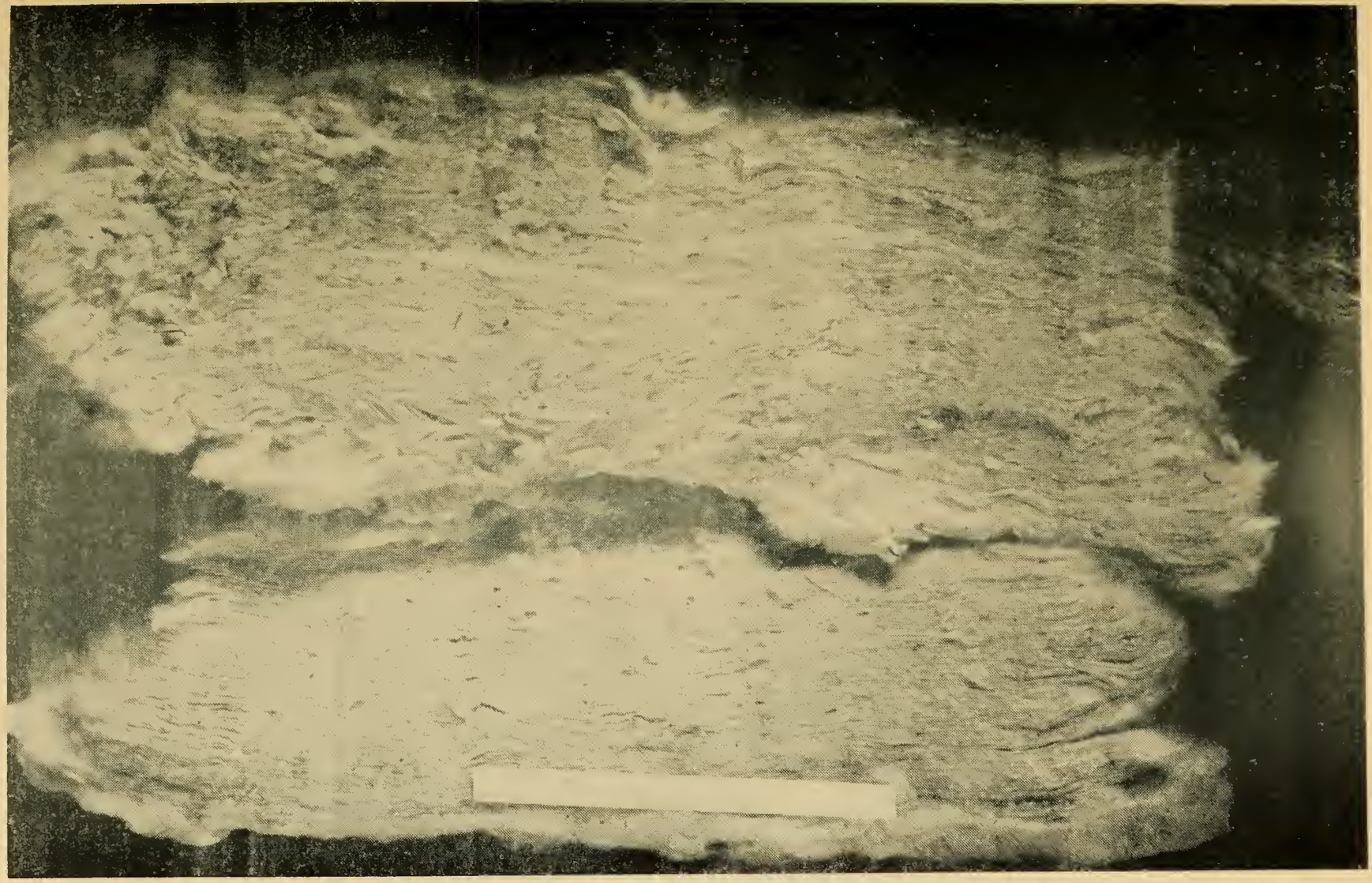

FIGURE 1.- CUT EDGES OF PLUGGED COTTON SAMPLE FROM COMPRESSED BALE. NOTE THE SMOOTHNESS OF THE LAYERS OF COTTON IN THAT PART OF THE COMBINED SAMPLE SHOWN AT THE BOTTOM, WHICH IS FROM THE BOTTOM OF THE BALE, AS COMPARED WITH THE OTHER PART OF THE SAMPLE, WHICH IS FROM THE TOP OF THE BALE.

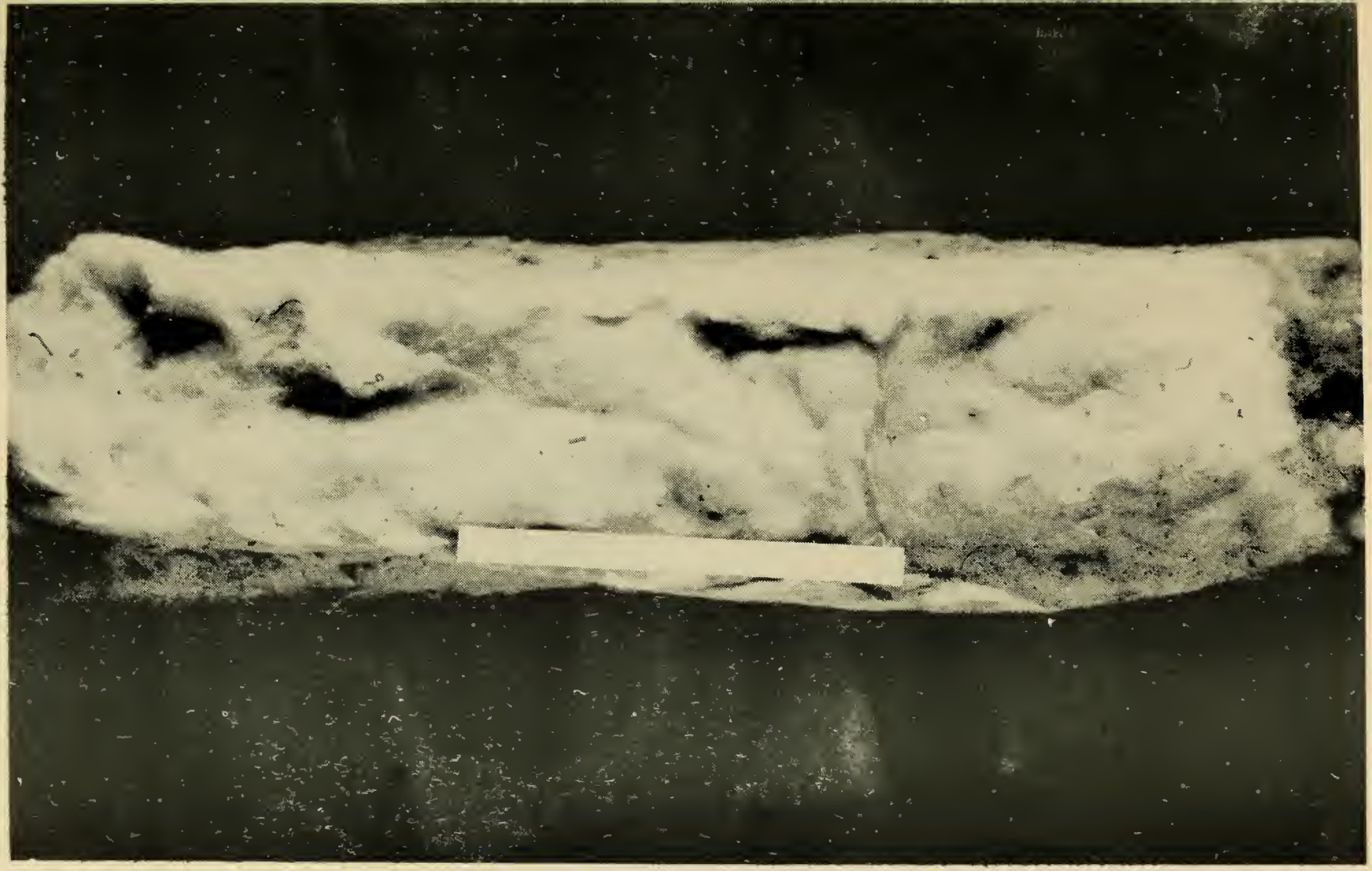

FIGURE 2.- OUTSIDE SURFACE OF PLUGGED COTTON SAMPLE FROM COMPRESSED BALE. SAMPLES DRAWN BY PLUGGING ARE COMPACT AND NEAT IN APPEARANCE.

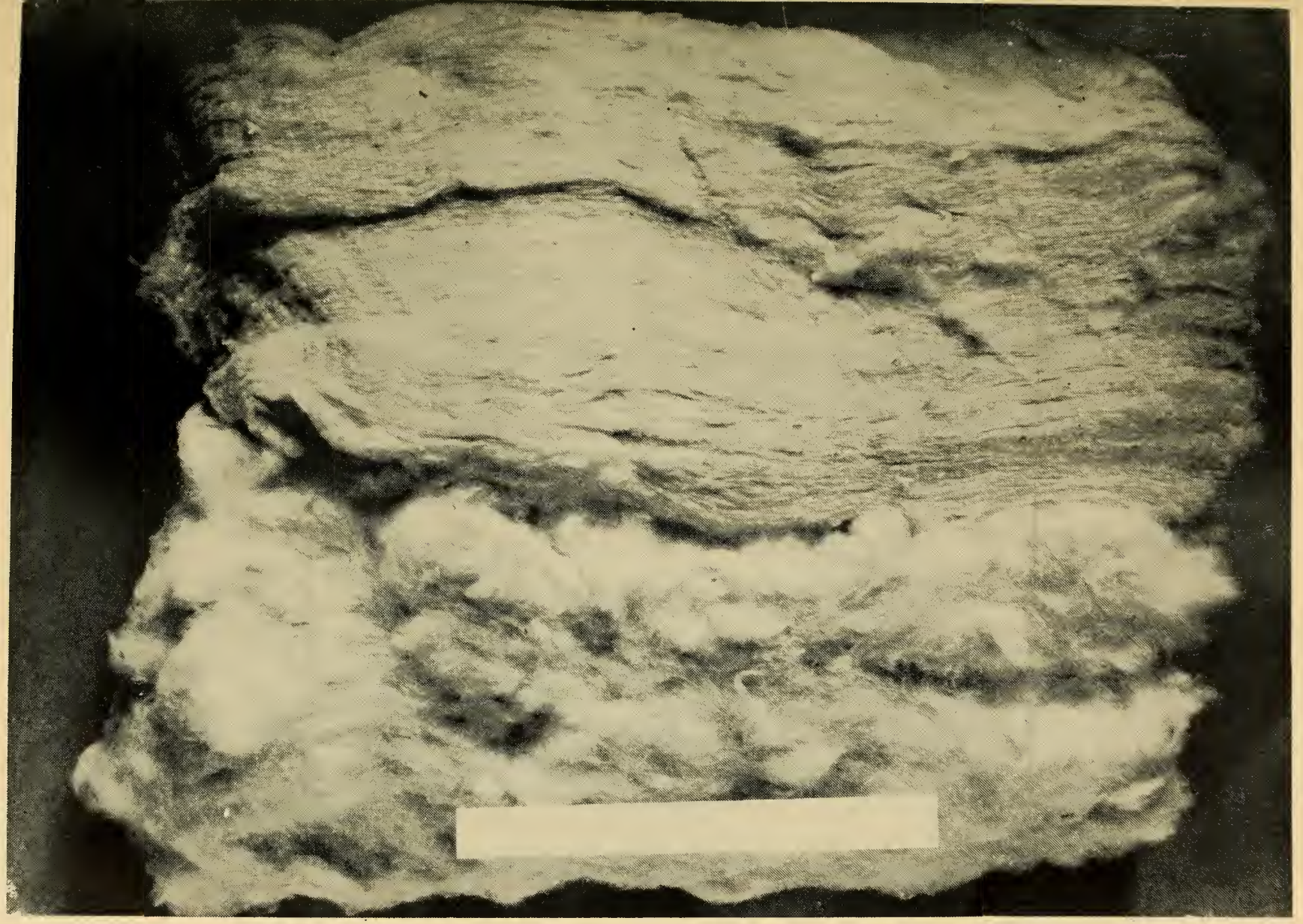

FIGURE 3.- EDGES OF COTTON SAMPLE DRAWN FROM COMPRESSED BALE BY CUTTING ONE EDGE ONLY. THE OPPOSITE EDGES OF THE SAMPLE ARE SHOWN. THE LAYERS OF COTTON ON THE CUT EDGE HAVE BEEN DISTURBED VERY LITTLE.

FIGURE 4.- OUTSIDE SURFACE OF COTTON SAMPLE DRAWN FROM COMPRESSED BALE AFTER CUTTING ONE EDGE ONLY. NOTE THE CRESCENT SHAPE OF THE CUT EDGE.

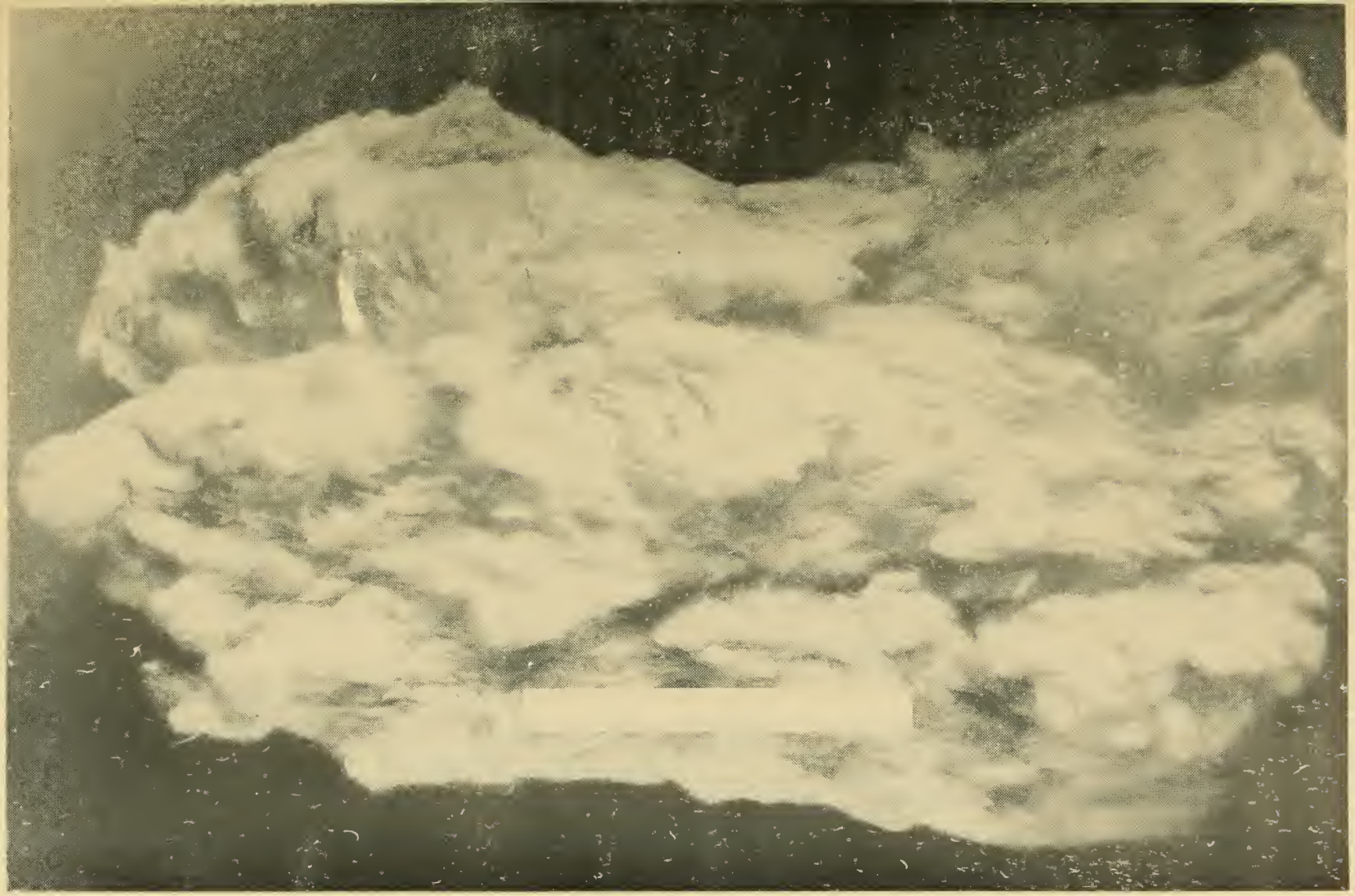

FIGURE 5.- SIDE OF COTTON SAMPLE PULLED FROM COMPRESSED BALE WITH A HOOK AFTER BAGGING ONLY HAS BEEN CUT. THE INFLUENCE OF THE HOOK IS SEEN IN THE UNEVENNESS OF LAYERS AND THE ROUGH APPEARANCE OF THE SAMPLE.

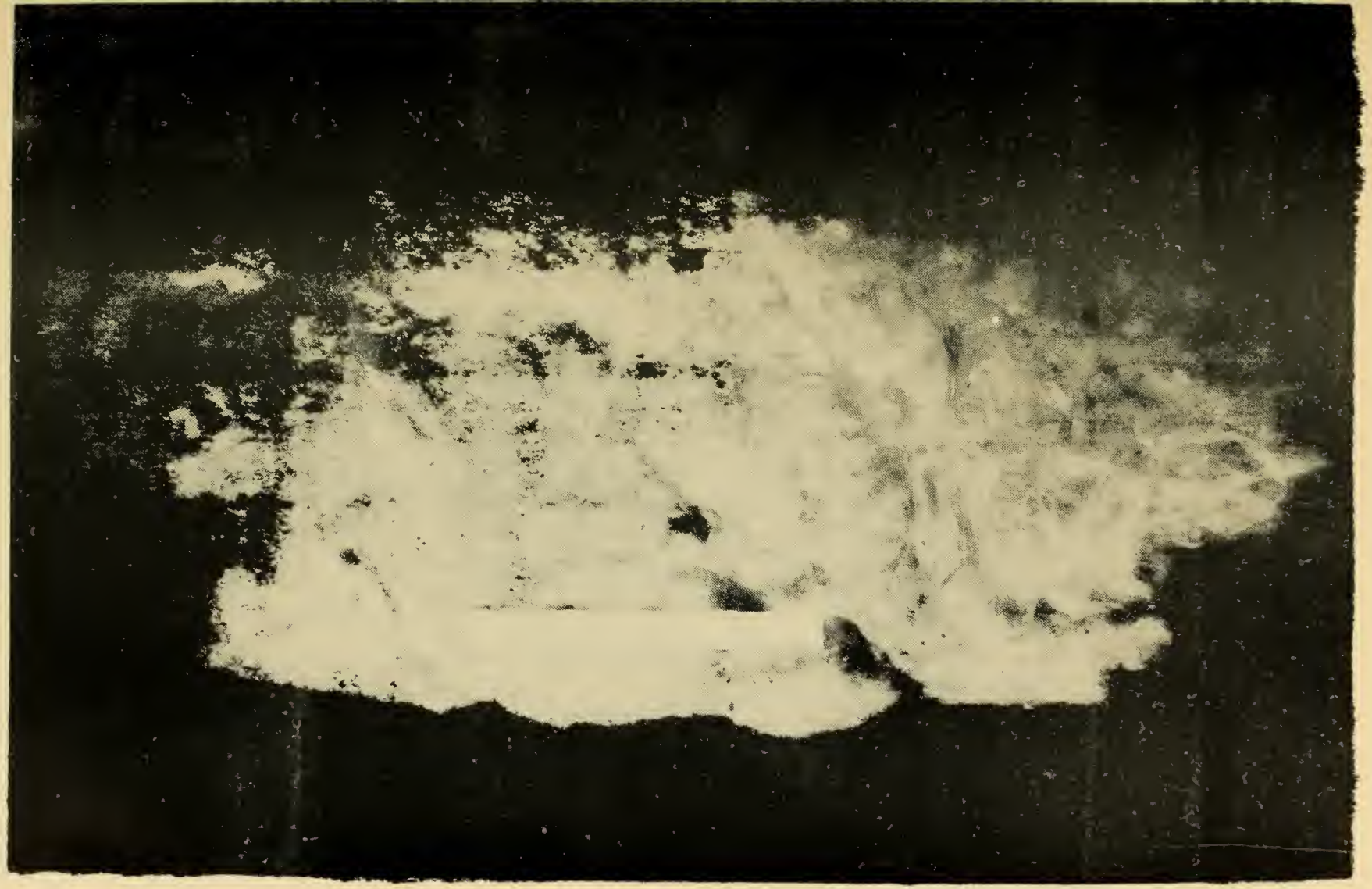

FIGURE 6.- OUTSIDE SURFACE OF COTTON SAMPLE PULLED FROM COMPRESSED BALE WITH A HOOK AFTER BEGGING ONLY HAS BEEN CUT. THE HOOKED SAMPLE IS USUALLY IRREGULAR IN SHAPE WITH IRREGULAR ED

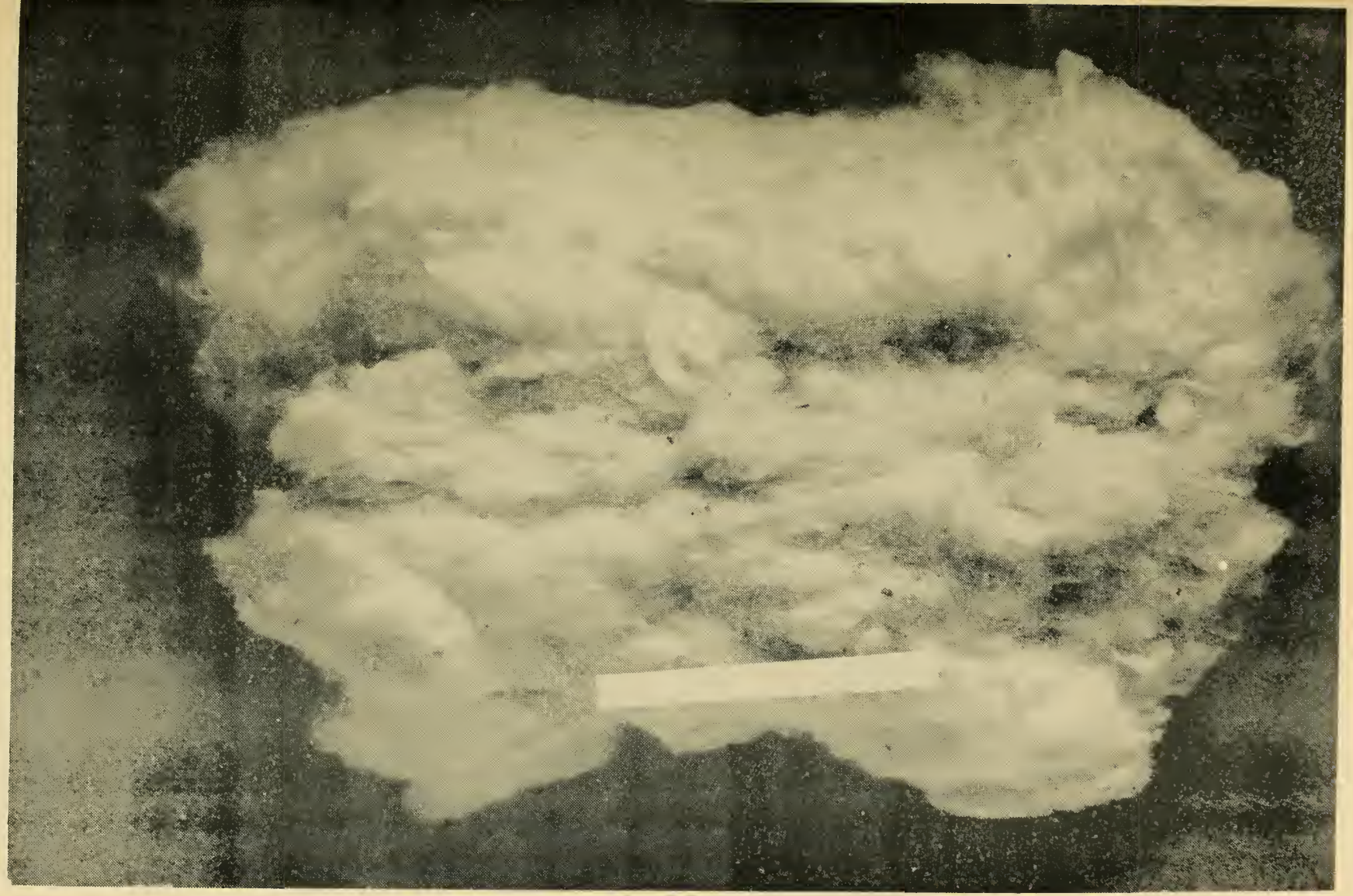

FIGURE 7.- SIDE OF COTTON SAMPLE PULLED FROM COMPRESSED BALE BY HAND AFTER THE BAGGING ONLY HAS BEEN CUT. THE LAYERS OF COTTON IN THIS SAMPLE HAVE BEEN CONSIDERABLY DISTURBED.

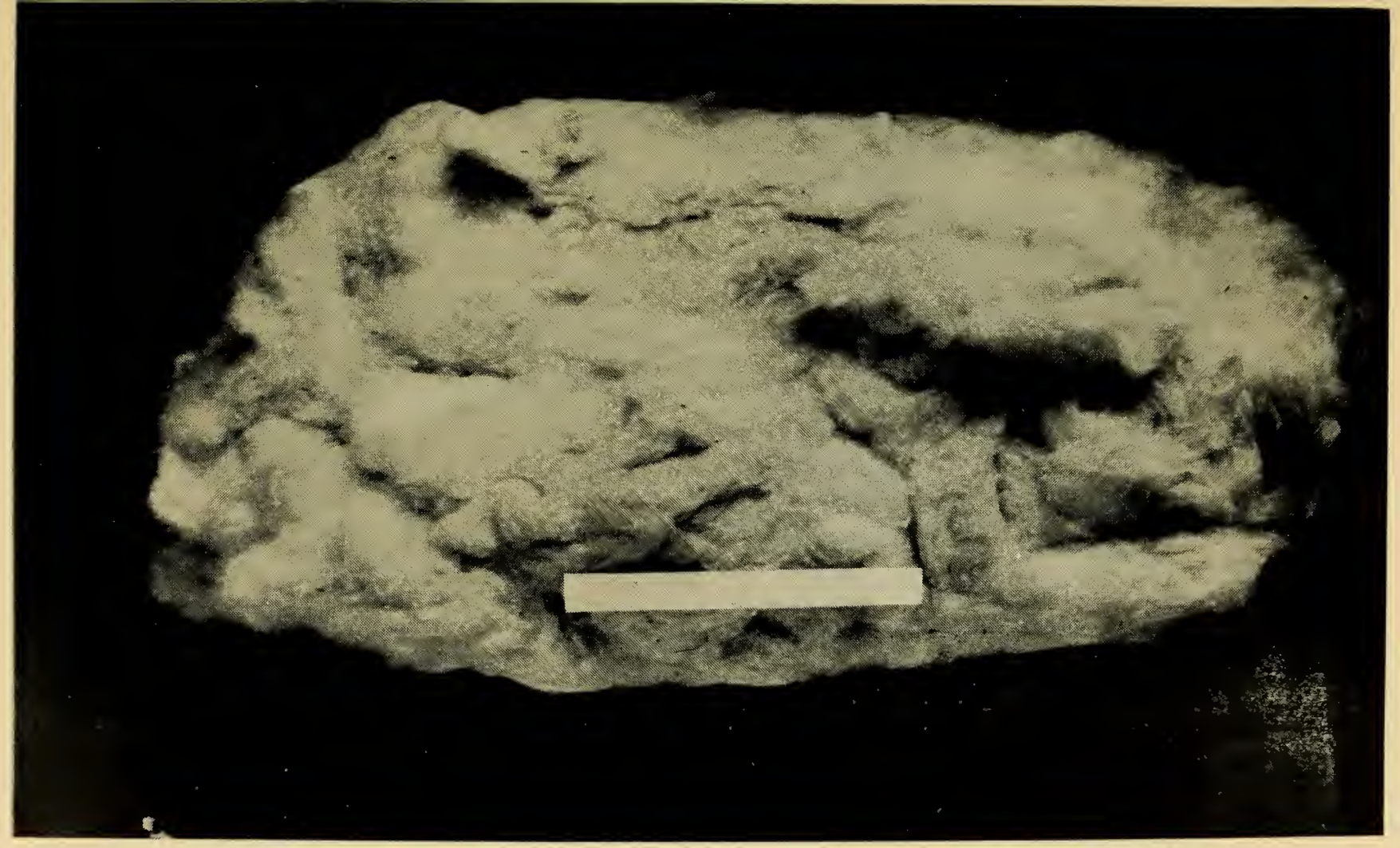

FIGURE 8.- OUTSIDE SURFACE OF COTTON SAMPLE PULLED FROM COMPRESSED BALE BY HAND AFTER BAGGING ONLY HAS BEEN CUT. THE SAMPLE PULLED BY HAND IS THE SMALLEST OF THE FOUR TYPES OF SAMPLES ILLUSTRATED.

FIGURE 9.- CUTTING A PLUGGED COTTON SAMPLE FROM A HIGH-DENSITY BALE. NOTE THE POSITION OF THE SAMPLER'S HANDS WHILE CUTTING THE EDGES. A NEAT SAMPLE OF GOOD WIDTH AND OF UNIFORM WIDTH CAN BE DRAWN FROM THE BALE AFTER CUTTING THIS WAY.

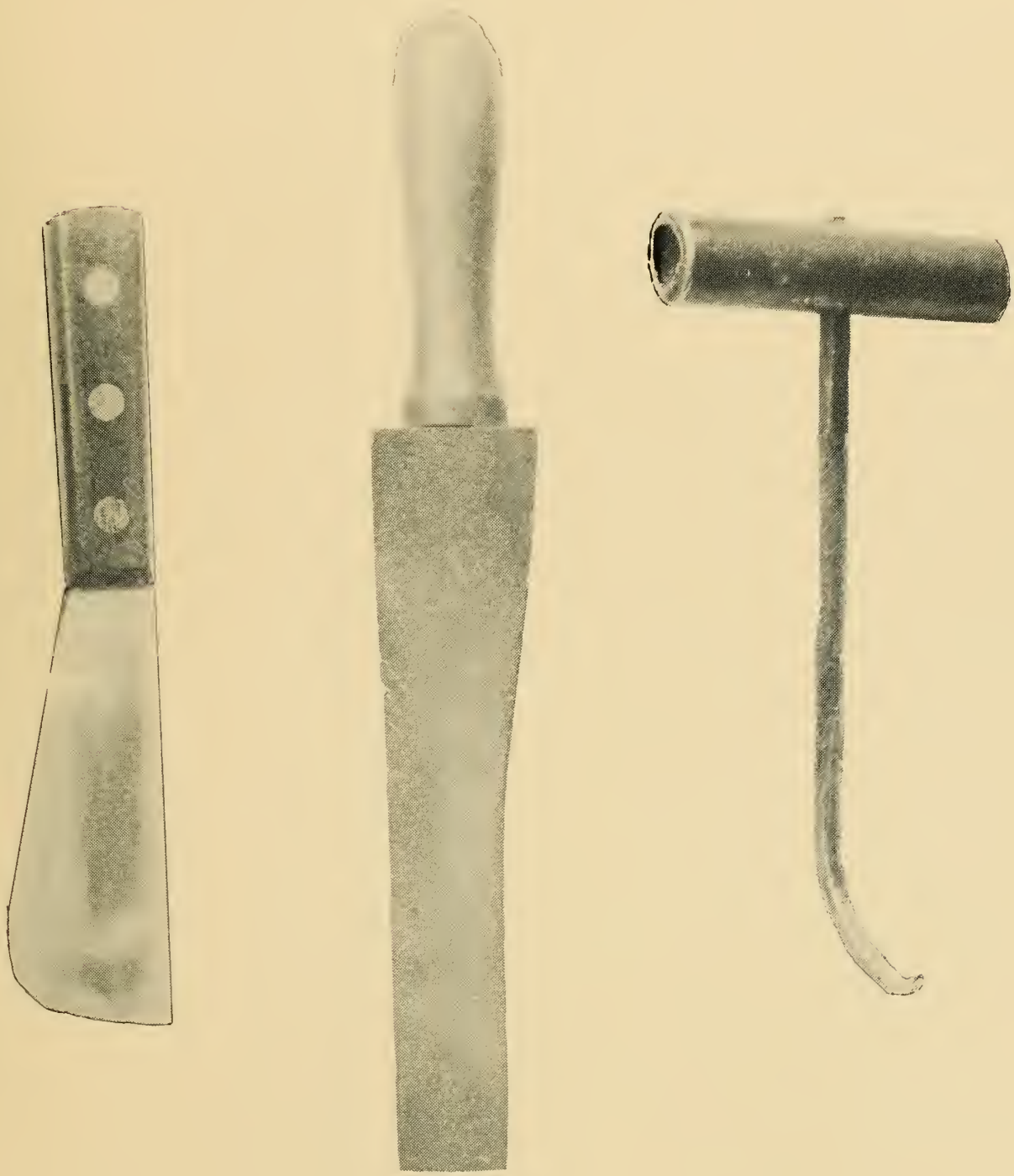

FIGURE 10.- KNIFE USED IN SAMPLING COTTON, CARBORUNDUM ROCK USED FOR SHARPENING KNIFE, AND COTTON HOOK.

Table 1. - Number and percentage of compresses and warehouses visited where specified types of samples were drawn from cotton bales, by States, 1933

State	Compresses and warehouses visited		Type of sample drawn															
			Plugged, or blocked, only		Cut on one edge only		Pulled with a cotton hook only		Pulled by hand only		Plugged or cut on one edge 1/		Cut on one edge or pulled with a cotton hook		Pulled with a cotton hook or pulled by hand		Pulled with a cotton hook or plugged	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	148	100.0	2	1.4	33	22.3	36	24.2	46	31.1	15	10.1	5	3.4	10	6.8	1	0.7
Alabama	13	100.0	0	----	2	15.4	4	30.7	3	23.1	1	7.7	0	----	3	23.1	0	----
Arkansas	12	100.0	0	----	1	8.3	11	91.7	0	----	0	----	0	----	0	----	0	----
Georgia	23	100.0	0	----	1	4.3	2	8.7	17	74.0	0	----	0	----	3	13.0	0	----
Louisiana	14	100.0	0	----	4	28.6	6	42.9	0	----	1	7.1	2	14.3	0	----	1	7.1
Mississippi	7	100.0	0	----	0	----	4	57.1	1	14.3	0	----	0	----	2	28.6	0	----
Missouri	2	100.0	0	----	0	----	2	100.0	0	----	0	----	0	----	0	----	0	----
North Carolina	12	100.0	0	----	0	----	0	----	12	100.0	0	----	0	----	0	----	0	----
South Carolina	11	100.0	0	----	0	----	1	9.1	10	90.9	0	----	0	----	0	----	0	----
Tennessee	6	100.0	0	----	0	----	2	33.3	1	16.7	0	----	1	16.7	2	33.3	0	----
Texas	46	100.0	2	4.3	25	54.4	4	8.7	0	----	13	28.3	2	4.3	0	----	0	----
Virginia	2	100.0	0	----	0	----	0	----	2	100.0	0	----	0	----	0	----	0	----

1/ Mostly plugged.

Sample Cut on One Edge Only.- When a sample is drawn after cutting one edge with a knife, the procedure is as follows. With the same kind of knife as that used when plugging samples, a cut 12 to 16 inches long, usually describing a crescent, is made in the bale, the horns of the crescent pointing toward either the top or the bottom end of the bale. The depth of the cut, which should be made at one stroke of the knife, is usually about 1-1/2 inches on flat bales and 3/4 inch to 1-1/2 inches on standard-density and high-density bales. The cut edge is then grasped firmly, and the sample is pulled from the bale. The cut edge remains comparatively undisturbed and smooth, but the edge pulled loose from the bale is rough and somewhat irregular (figs. 3 and 4). A similar sample is drawn from the other side of the bale, and both samples are trimmed. One of the identifying coupons is then removed from the tag on the bale and placed between the two samples, after which they are rolled or wrapped and disposed of in the same way as described for plugged samples.

No loss in weight due to loss of bagging occurs when this method of sampling is employed. As a sample cannot be pulled so close to the bands as it can be cut, this type of sample is not so wide as the plugged sample. One point in favor of so cutting the sample that the horns of the crescent point toward the top end of the bale is that, so long as the bale remains in that position, the portion of the bagging so cut will naturally fall down over the sample hole and cover the opening; whereas, if the horns of the crescent point toward the bottom end of the bale, the bagging that covered the sample will fall down and leave the sample hole open and, in addition, will be in the way if a sample from between the next two bands below the sample hole is desired.

The use of the knife on only one edge of the sample is the predominant method of sampling at the compresses visited in Texas. Other States in which this method is used are Alabama, Arkansas, Georgia, Louisiana, and Tennessee. It is the method employed exclusively at 22 percent of all the compresses and warehouses visited in the United States (table 1).

Sample Pulled from the Bale with a Cotton Hook.- The cotton hook used in obtaining a sample from a bale consists of a cylindrical handle about 6 inches long, usually made of wood, and a steel rod that passes perpendicularly through the handle at the center and extends about 6 to 8 inches, the pointed end curving into a half circle (fig. 10). In drawing this type of sample, the sampler first uses the knife, making a cut from 12 to 16 inches long, often through the bagging only. The hook is then used to dig into the bale and pull the fibers loose. In doing this, the hook is placed parallel to a band and as near as possible to it. This action may be repeated for pulling the other edge of the sample loose from the bale, or the hook may be discarded after the first edge is loosened and the hands used instead to pull the sample from the bale. The operation of drawing a sample with the hook requires practically the same time as is required by other methods.

A sample that has been pulled with the aid of a hook has rough, irregular edges that show comparatively little trash (figs. 5 and 6). The layers of cotton are not so compact as are the layers in the plugged sample, for they have been ruffled up by the hook, and this sample cannot be so wide as the sample that is plugged.

Of the 148 compresses and warehouses visited in the Cotton Belt, 24 percent reported the use of a hook to draw their samples, and this method was used to some extent in all States except North Carolina and Virginia (table 1).

Sample Pulled from the Bale by Hand.- Much cotton is sampled by pulling the sample from the bale by hand. A knife is first used to cut the bagging, the cut being made in the shape of a crescent or a rectangle or in a straight line. No effort is made to cut into the fibers of the bale, the fingers being used to grapple and pull the layers of cotton loose along one edge of the sample, after which it is grasped, with the hands parallel to the bands, and pulled from the bale. Each grapple ruffles up the cotton on the edge of the sample, disturbing and possibly dislodging and losing some of the trash.

The edges of the hand-drawn sample look rough, and the sample is not so smooth as are the plugged samples (compare figs. 7 and 8 with figs. 1 and 2). The hand-pulled sample is more likely to have a waddy appearance, and the chance of breaking the sample in two across the layers is greater with this method than with any other. On the average, the hand-pulled sample is the smallest and thinnest of the four types.

The ports visited where samples were taken by hand are Norfolk, Va., Mobile, Ala., and Savannah, Ga. In Mobile, however, hand-drawn samples are an exception rather than the rule. At one compress in Mobile, hand-drawn samples were taken from flat bales only occasionally, the hook being used on compressed bales. Samples were drawn by hand exclusively at establishments visited in the States of North Carolina and Virginia (table 1); and this was the method used at more than 90 percent of the establishments visited in South Carolina. Only at the port of Charleston was any other method employed. No compresses or warchouses using the hand method of drawing samples were found in the States of Texas, Louisiana, Arkansas, or Missouri; but this method is used exclusively at 31 percent of the compresses and warehouses visited in the United States.

It is possible that at some time in the future a satisfactory motor-driven sample cutter may be perfected, in which case the practice of drawing plugged samples might be considerably increased.

Factors Affecting Representativeness of Sample

The consideration of first importance in sampling cotton is that the sample be adequately representative of the bale. A good sample will enable the classer to determine the quality of the major portion of the lint making up the bale and to determine also whether the bale is plated or two-sided. Inasmuch as there is some confusion of the terms plated, false-packed, mixed-packed, and two-sided as applied to bales of cotton, a brief explanation of each of these terms, as used thrcughout this discussion, seems advisable.

A plated bale is one having a thin layer of lint on the top and/or bottom surface. This layer may be (1) of different quality or (2) of different origin, whether or not it differs in quality. The term "plated" is

usually applied when this surface layer is not too thick to be penetrated in taking the sample. A false-packed bale is one (1) containing substances entirely foreign to cotton; (2) containing damaged cotton in the interior with or without any indication of such damage upon the exterior; (3) composed of good cotton upon the exterior and decidedly inferior cotton in the interior, in such manner as not to be detected by customary examination; or (4) containing pickings or linters worked into the bale. An augur is sometimes used for boring into the end of a bale that is suspected of being false-packed. According to the present regulations under the U. S. Cotton Futures Act (May 1936), a mixed-packed bale is one which in the samples drawn therefrom (1) shows a difference of two grades or more, if of the same color; or (2), if of the same grade but of different colors, is Blue Stained and either White, Spotted, Yellow Tinged, Light Stained, or Yellow Stained, or which, if none is Blue Stained, shows a difference of two or more color gradations; or (3) if the samples are of different grade and different color and show a variation in quality exceeding that between one grade in one color and the next higher or lower grade in the next higher or lower color; or (4) shows a difference in length of staple exceeding 1/16 of an inch. 3/ A two-sided bale is one having on its top and/or bottom surface lint that differs in quality in any noticeable quantity. Certain two-sided bales may be plated and others may be mixed-packed within the above definitions. Still other two-sided bales may not come within the definition for either plated or mixed-packed bales.

Ginning and Baling.- The degree to which the sample represents the bale depends, first, on the uniformity in quality of seed cotton brought to the gin by the grower, and, second, on the thoroughness with which the cotton is mixed while it is being unloaded and carried through the cleaning and ginning equipment. At some gins an employee handles the suction pipe and unloads the seed cotton in such a way as to get a good mixture. At other gins the person handling the suction pipe may not be so experienced, in which case a good mixture may not be obtained.

Lack of uniformity in seed cotton when presented for ginning may result from one or more of a number of causes, among which may be mentioned the following. (1) Rain may have come while the cotton making up the bale was being picked, that picked after the rain producing lint of lower grade than that picked before the rain. (2) The farmer may have been growing two varieties of cotton on his farm, and, not having a sufficient quantity of the pickings of one variety to make a bale, may have included enough of the other variety to make up the required load of seed cotton. (3) The ginner may have bought up various lots of seed cotton and stored them in the gin house or elsewhere until such time as he could conveniently gin the accumulated lot, too little care being taken to keep the different grades and staples separated. Occasionally a portion of this cotton may have been picked and other portions may have been harvested by snapping or sledding. Mixed-packed bales or plated bales may be the result.

3/ The regulations in effect in May 1936 declare bales showing within themselves a difference of staple exceeding 1/16 inch to be mixed-packed. At that time, however, a revision of this definition was under consideration, and interested persons would do well to inform themselves of any change that may have since been made in the regulations.

When a load of seed cotton that varies in quality is presented for ginning, the ginner can do little more than mix the cotton thoroughly. Unless this is done, a two-sided bale is almost certain to result. The classification of samples from such a bale will probably vary with the position on the bale from which the samples are drawn.

Another ginning factor of importance in connection with obtaining a representative sample is the seed cotton from the last load remaining in the distributor, cleaner-feeders, and roll box when the press box is turned to receive the cotton for the next bale to be ginned. Some ginners claim that it wastes much time and machine power to let the rolls run until they stop turning, and that, since the press box is turned at the same time on each bale, no loss in pounds of lint is suffered by the farmer. However, if all the seed cotton has not been ginned and passed into the press box before the press box is turned, this cotton will form a layer on the bottom of the following bale, the lint of which may or may not differ materially from the remainder of the lint that makes up that bale.

If this layer is of either better or poorer quality than the average for cotton in the bale, it may prevent the drawing of a representative sample and thus affect the classification of the bale. It should be borne in mind that the commercial sample used in cotton classing is, in reality, composed of two samples, one from the bottom side and one from the top side of the bale, and that it is customary to buy cotton on the basis of that portion of the combined sample that is lowest in grade and staple. In spite of the fact that plates on bales of cotton are often so thin as to be recognized by the classer as of minor importance, it should be remembered that when a layer of inferior cotton is placed on a good bale, an injustice is done the farmer who grew the cotton.

The thickness of the plate on a bale of ginned lint depends on several factors, among which are the size of the gin, the type of ginning machinery, the variety of cotton, and the quantity of cotton left in the machinery when the press is turned.

F. L. Gerdes, associate cotton technologist in charge of the cotton fiber research work at the Department's ginning laboratory at Stoneville, Miss., found that if the press box is not turned promptly but instead the saws are allowed to run until the seed roll stops turning, more or less short fibrous material is deposited on the top side of the bale. The quantity of this fibrous material deposited will depend also upon the variety of the cotton and the size of the gin. 4/ Mr. Gerdes found that this deposit contains linter fiber ginned from the seed from the time the feeding supply is exhausted to the time the roll stops turning, and that it is often considerably discolored, especially if the cotton being ginned is of a variety having big, fuzzy seed.

Ordinarily this deposit is too thin to affect the grade or staple of the bale unless the sample is not sufficiently trimmed.

4/ The number of gin stands and saws varies from 1 stand and 60 saws to 6 stands and 80 saws; other things being equal, the smaller the gin, the thinner the layer of fibrous material.

Another cause of plating on the top side of bales is the re-cleaning of seed cotton. Certain types of gins have an overflow of seed cotton from the distributor. Later, this cotton is passed through the overflow suction pipe to the cleaning machinery, is re-cleaned, and is again presented to the distributor. If the gin stands are still too crowded to take all of the cotton presented, the distributor throws the excess to the overflow pile, and the cleaning process is repeated. Should the operation of the over-flow system cause seed cotton to pass through the cleaning equipment two or more times, a plate of different quality would probably be deposited on the top of the bale.

Ginning also affects the thickness of the plate in another way: the plate may not be of uniform depth. It may be thick on one end of the bale and thin on the other end, or it may be thick in the center of the bale and thin on the ends. Charles A. Bennett, senior mechanical engineer in charge of engineering work at the Department's experimental cotton ginning laboratory at Stoneville, Miss., states that uneven distribution of fibers in a plate or a bale may be caused by an unequal rate of feed into the different gin stands, unbalanced action of brushes or air-blast nozzles that deliver the ginned fiber from the gin stands, or a combination of these two causes. To quote Mr. Bennett, "Standard construction of the lint flues in gins introduces the fiber from each gin stand to the main lint flue in such a manner as to give a spiralized or twisting delivery of the lint to the condenser. This delivery, acting like a thread on a screw, will discharge lint from any particular gin to a certain position on the condenser screen; consequently, the failure of all the units to deliver lint uniformly and in equal quantities will result in the bat being thicker at one place than another, and as the bale is built up, more fiber accumulates in the corresponding position within the press box. If one stand is not fed at the same rate as that for other stands, or if the doffing action of the brushes or air-blast nozzles produces a greater velocity of discharge from one gin stand than from another, it will be seen that it becomes possible for the bat to be thinned out in one place and thickened in others."

Since a bale packed in this way is not of uniform density, and since this lack of uniformity affects the top layer of fibrous material as well as the underlying cotton, it is possible for a sample to be drawn at a point on the bale where this layer is likely to be thick and another sample to be drawn through a thin portion of the layer at a different position on the bale. This may result in differences in classifications for the same bale, due to actual quality differences in the samples drawn.

In some cases, the ginner avoids placing the plate on the bottom of the bale by turning the press box one-fourth of the way around. As the ginning of the new bale is started, the lint from the previous bale that was left in the roll box is allowed to fall to the floor. After a part of the lint from the new bale is ginned into the press box, the lint from the previous bale is thrown into the center of the bale, and the ginning continues.

This is a violation of law in some States 5/, and so far as known is not a general practice elsewhere. 6/

Developments in the mechanical design of gin machinery that would obviate the plating of bales would be of great value. Not only would it increase the representativeness of samples, but it would remove one of the factors that frequently affects the classification of the grower's cotton.

Cotton buyers in different parts of the Cotton Belt were interviewed in an effort to obtain information concerning the prevalence of two-sided bales of cotton marketed in the territories in which they operated. Cotton buyers of all types were included, some of them being among the largest buyers of cotton in the United States, and some being only small country merchants. Since it is not known how much cotton was handled by each buyer, or how much cotton was grown in the territory in which each operated, there is no satisfactory method of weighting the information given by these buyers concerning two-sided bales.

Unweighted averages of the estimates were computed, therefore, for the various States, and they are presented in table 2 as an indication of the prevalence of two-sided bales. Inasmuch as two-sided bales are valued for grade according to the "low" side and for staple according to the "short" side, it can be seen that losses thus sustained by farmers alone in the United States amount to thousands of dollars during each season.

Bales of cotton the two sides of which vary one-sixteenth of an inch or more in staple length are not desired by many spinners even at a price representing the value of the shortest staple length. Unless the rolls on a spinning frame are reset, cockled yarn is likely to result from the spinning of cotton that averages longer in staple than that for which roll settings have been made. Bales that are two-sided in grade can be used at some mills, but spinners often reject them.

Another matter connected with ginning that should have attention because it affects the sampling of cotton, is the roughly packed top side of the bale. It is common knowledge among cotton samplers who work at compresses that it is easier to get a sample of desirable size from the bottom side of the bale than from the top side. The first cotton that falls into the press box forms the bottom of the bale. The sample from the bottom of the bale does not break into parts as does the sample from the top side. In other words, the sample from the bottom of the bale will usually open into layers, which in most instances are the length of the sample; whereas the sample from the top of the bale will not open into layers so readily and often has a rough, wadded appearance. This roughness is not of the same intensity in all samples, but few samples from the top of the bale are so rough that the grade assigned is lower than it otherwise would have been, or that, in trade terms, the grade is reduced. An extreme case of roughness

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5/ See extracts from State laws relating to false packing of cotton, p. 36.
6/ A mechanical device has been invented for catching the first part of the lint for each bale, allowing the next lint ginned to fall into the press box. The first lint ginned is then deposited into the press box, and the bale is completed.

in packing gives the sample drawn from the top of the bale the appearance of loose cotton. If the sample is trimmed rather deeply, however, this is not so noticeable, especially if the last layers of cotton distributed to the bale were folded smoothly. The layers of cotton in the sample from the top side of the bale are not so long, as a rule, as those in the sample from the bottom side of the bale. The shorter layers and the greater roughness are two useful indicators of the top side of the bale. Notwithstanding the rough appearance that is sometimes noticeable in the sample from the top side of the bale, it is usually the more representative of the two portions of the sample. It is of the same origin, presumably, as the major portion of the cotton in the bale, for the bottom of the bale may be plated with cotton of different quality from the load of seed cotton previously ginned.

Table 2.- Estimated percentages of two-sided bales among cotton bales handled by buyers interviewed in specified States, crop of 1932-33

State	Buyers interviewed	Average percentage 1/ of two-sided bales handled
	Number	Percent
Total	161	12.7
Alabama	11	11.8
Arkansas	15	15.3
Georgia	19	7.2
Louisiana	8	2/
Mississippi	9	14.2
Missouri	2	17.5
North Carolina	11	13.9
South Carolina	13	12.7
Tennessee	6	4.4
Texas	64	18.3
Virginia	3	11.8

1/ Unweighted average of buyers' estimates.
2/ No data.

Gin-manufacturing companies and ginners vary in their opinions as to the cause of the rough top side of a bale. Some manufacturers of gin machinery state that when the top side is rough, the picker roll is not properly timed. Mr. Bennett gives the following explanation: "Frequently, during the final minutes in the ginning of a bale of cotton, the chutes leading to the feeders are irregularly filled and the seed cotton is not uniformly spread over the entire length of the stand. This results in dribbles of seed cotton feeding down on one side of the gin only, and consequently the saws are delinting one portion of the seed roll while ginning at a varied

rate on the remainder. This action of itself may produce a severe roughness in the sample, and scanty accumulations of cotton in the condenser chute will result in accentuating this roughness when the doffers discharge the lint into the press box. If the ginner does not raise the gin breasts promptly when finishing the bale, the seed rolls are ginned down to different densities so that variable amounts of cotton remain in the seed-roll boxes, and very irregular plating may result on one side of the bale."

Under certain circumstances the cotton classer finds it desirable to be able to identify the sample drawn from the top side of the bale as distinguished from that drawn from the bottom side. Information concerning the distinguishing characteristics of the two sides of the bale was therefore sought from those interviewed concerning sampling practices. The identity of the top and bottom sides of the flat bale can be determined in almost every instance by observation. First, the buckles are usually near the top of the bale, and the opening of the buckle is always toward the bottom, resulting in a longer lap in the ties toward the bottom of the bale. In those instances in which the buckles are placed so near the center of the bale that there may be some difficulty in identifying the top side of the bale by this method, a second means of identification may be found in the smoothness with which the bagging covers the top of the bale and hangs over the sides. Gravity will cause the bagging on the top side of the bale to hang down smoothly, whereas wrinkles in the bagging will usually be seen on the bottom side, particularly at the edges. The identification of the top and bottom sides of standard-density and high-density bales is a more difficult problem, but one that in many instances it is possible to solve. For example, the top side of a flat bale will still be the top side of that bale after compression if a small auxillary press has been used to remove the bands before compressing. The position of the buckles and the smoothness of the bagging will thus indicate the top and bottom sides of this bale, as in the case of the flat bale.

An additional test is sometimes applied when it is known that the top side of the flat bale was up when placed in position for compression. If this fact can be established, then it is possible to determine by the following procedure which side of the compressed bale was the top side of the original flat bale. The finger nails are drawn against the sides of the bale; the side will feel rough when the nails are drawn from the bottom of the bale toward the top; but when the nails are drawn in the opposite direction, the sides will feel very smooth. It should be borne in mind that this method can be applied only to the extent that the fact can be established that the flat bale was placed in the press with the top side up.

It was found that the top and bottom sides of flat bales could be identified at 92 percent of the compresses and warehouses visited, as compared with 64 percent for standard-density bales and 61 percent for high-density bales (table 3). In order that the classer may determine which of the two portions of the sample is more nearly representative of the major part of the cotton in the bale, some adequate means of identifying the top and bottom sides of all bales is desirable. This might be accomplished

through a tag or marker placed at a fixed point on the bale at the time of ginning, to remain in that position throughout the existence of the bale.

Table 3.- Comparative ability to identify top and bottom sides of flat, standard-density, and high-density bales of cotton at compresses and warehouses visited, by States, 1933

State	Compresses and warehouses visited	Proportion of total compresses handling specified types of bales at which top and bottom of such bales could be identified		
		Flat	Standard-density	High-density
	Number	Percent	Percent	Percent
Total	148	91.9	63.5	60.7
Alabama	13	100.0	77.8	77.8
Arkansas	12	91.7	90.9	87.5
Georgia	23	100.0	20.0	28.6
Louisiana	14	92.9	16.7	21.4
Mississippi	7	100.0	100.0	100.0
Missouri	2	100.0	50.0	---
North Carolina	12	66.7	---	---
South Carolina	11	72.7	33.3	100.0
Tennessee	6	100.0	66.7	33.3
Texas	46	95.7	71.8	73.2
Virginia	2	50.0	---	---

Drawing the Sample.- Although many of the compress and warehouse managers interviewed seemed to think that the method of sampling employed locally was the only method used to any extent in the United States, there was a consensus of opinion among buyers that a poorly drawn sample affects the classification of the bale, and many buyers stated that classification varies with the method of drawing the sample (table 4).

Only about 3 percent of the buyers were of the opinion that the method of sampling affects staple-length classification. There is reason to believe that some buyers who answered in the negative did not take into account the fact that variations in classing may result from differences in the degree to which different samples pass through the plate. These variations may result from hurried stapling of samples inconspicuously plated with cotton of the same grade as the remainder of the bale but of different staple length.

Of all buyers interviewed, 25 percent stated that the method of sampling affects grade, and nearly 65 percent stated that it affects the appearance of the sample. The outstanding fact brought out by a comparison of the data shown in tables 1 and 4 is that more than 86 percent of the buyers interviewed in Texas, Louisiana, and Alabama, where the more attractive plugged and cut samples are in use, thought that the method of sampling

would affect the appearance of the sample; whereas approximately 60 percent of the buyers interviewed in South Carolina and 90 percent of those in North Carolina, where samples are drawn by hand almost exclusively, thought that the method of drawing would not affect the appearance of the sample.

Table 4.- Buyers interviewed and percentages of them stating that method of sampling affects grade, staple length, or appearance of sample, by States, 1933

State	Buyers interviewed	Percentage of buyers stating that method of sampling affects --		
		Grade	Staple length	Appearance of sample
	Number	Percent	Percent	Percent
Total	161	24.8	3.1	64.6
Alabama	11	18.2	---	90.9
Arkansas	15	33.3	---	60.0
Georgia	19	15.8	---	52.6
Louisiana	8	37.5	12.5	87.5
Mississippi	9	---	---	33.3
Missouri	2	---	---	50.0
North Carolina	11	---	---	9.1
South Carolina	13	15.4	---	38.5
Tennessee	6	16.7	---	50.0
Texas	64	35.9	6.3	85.9
Virginia	3	---	---	---

The different sampling practices prevailing in the different parts of the Cotton Belt may be explained to some extent by differences in circumstances surrounding the marketing or handling of cotton in the different areas. It will be observed, for example, that the hook is much used in sampling Delta cotton. In this connection, attention is called to the fact that, inasmuch as the natural appearance of long-staple cotton is somewhat more rough or stringy than that of other cotton grown in the United States, the extent of additional roughness caused by the hook or by pulling these samples by hand is not readily apparent.

At one compress visited in Virginia, all samples -- whether from flat, standard-density, or high-density bales -- were drawn by hand. But many managers of compresses visited were of the opinion that, although a good sample can be taken with the hands from a flat bale, it would be impossible to obtain in this way a good sample from a compressed bale. A large number of high-density bales were observed with bands so close together that an adequate sample could not be obtained without breaking a band, and several bales were seen on which bands were crossed. Breaking and replacing bands require loss of time and involve added expense, and some shippers will not allow the bands to be broken after the bale has been compressed. Thousands of bales are sampled

after compression at interior compresses and elsewhere in Texas and Louisiana, the samples sometimes measuring as little as 2 inches in width.

There is considerable variation in the size of samples drawn by the different methods from different kinds of bales. The width of the sample from a flat bale averages between 6 and 7 inches. The largest samples observed were those from the Delta area in Mississippi. In this area, it is the practice to pull samples that are as long as possible and as deep as can be obtained with a hook. They are in many instances as long as the width of the bale. Buyers state that much cotton produced in Mississippi is sold by brokers and that the original sample is divided into two parts in order to have for their use two samples from the same sample hole. Samples from compressed bales in Texas averaged 4 inches in width; but samples drawn in Mobile and Savannah, where the practice of better spacing of bands had been adopted for bales of cotton to be certificated, were found to average from 6 to 7 inches in width. In all areas the length of the compress sample appeared to depend also upon whether the cotton was to be certificated. 7/ Certain cotton classers insist that a satisfactory sample requires a minimum of 6 ounces of lint, 3 ounces from each side of the bale. They state that accurate determination of grade is not assured if the sample is too small.

When the sample is taken by hook, it is extremely difficult to pull the cotton close to the band, whereas by the plug method the sampler can cut the fibers parallel to and against the band, giving a little more width to the sample. Those who prefer taking samples with the hook say that it is less destructive to fibers than is the knife used in sampling. A hand-drawn sample is even smaller and thinner than a hooked sample, because of the difficulty of pulling the cotton close to the band. Because of the greater effort required to pull samples by hand, this method of sampling is said to encourage "pinching." 8/

The plug method is best for obtaining samples from standard-density and high-density bales on which the bands are placed close together. It has been suggested, however, that the sampling of high-density bales would be much facilitated by spacing the bands somewhat as shown in figure 11: two rather close together on each end of the bale and the other five at uniform intervals over the rest of the bale. 9/

7/ Specifications for samples from bales to be certificated are given in Service and Regulatory Announcement 124 of the Bureau of Agricultural Economics, United States Department of Agriculture.

8/ "Pinching" is the practice of making a very small hole in the bagging of a cotton bale and pulling a small sample by hand. The size of the sample is so small that it is said to be a pinch. A sample taken in this way probably will not weigh 1 ounce.

9/ This spacing, suggested by F. J. Heberlin of Galveston, Tex., is now used extensively in the Southwest. A. L. Reed, Secretary-Counsel for the Southwestern Compress and Warehouse Association of Dallas, Tex., aided materially in bringing about the adoption of the practice.

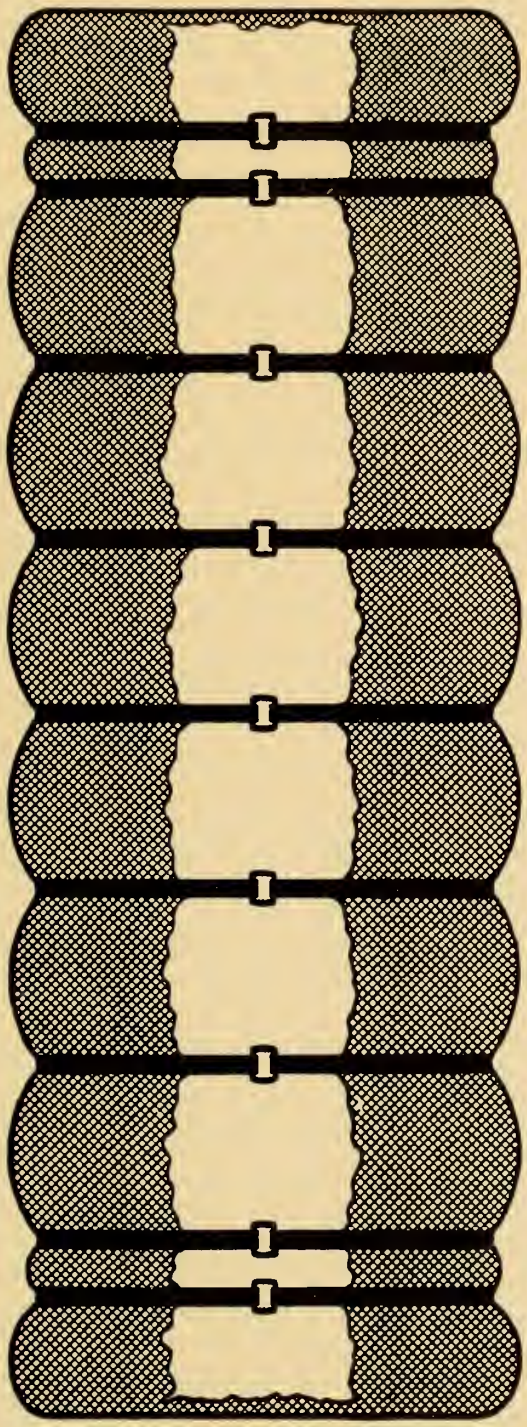

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FIGURE 11.- SUGGESTED SPACING FOR BANDS ON COMPRESSED BALES OF COTTON. SAMPLING IS FACILITATED BY PLACING TWO BANDS CLOSE TOGETHER NEAR EACH END OF THE BALE AND DISTRIBUTING THE REMAINING FIVE BANDS AT EQUAL INTERVALS OVER THE REST OF THE BALE.

If the grade of the cotton is low, the edges of a plugged sample are likely to show more trash or foreign matter than would the edges of the same sample drawn by another method. the density of the cotton at the edges being less disturbed by cutting than by grappling with either hook or fingers. The plugged sample thus provides an especially correct representation of the trash or foreign matter contained in the bale. Several large cotton firms in Texas have adopted the practice of requesting plugged samples for the classification of their cotton.

Similarly, when samples are drawn by cutting one edge only with a knife, the pulled edges, where the fibers have been somewhat disturbed, are likely to show less leaf or trash than do the cut edges (figs. 3 and 4); but these edges look rough, which probably counteracts the favorable impression due to absence of trash. It must be remembered that, although cotton is not classed by looking at the edges of samples, the psychological effect of attractive samples is to be considered.

Patching.- The drawing of representative samples may be prevented by the size and character of the patches used on bales of cotton. A very cheap patch is sometimes made by gathering up odds and ends of bagging, jute, and refuse, placing it in a burlap bag that has previously been used for fertilizer or cottonseed products, and sewing up the bag. This makes a thick, bulky patch that must be cut through in order to obtain a sample. The patch may be so thick that the proper depth cannot be attained, and an insufficient sample results.

Trimming the Sample.- To the extent that the outside surface of a cotton sample bears evidence of bagging trash, bagging stain, or ground stain, it is not representative of the major portion of the cotton in the bale. If the bale has been exposed to the weather for a long period, there is likely to be some rotten or damaged cotton on the outside of the bale, evidence of which may be found on the outside surface of the sample. For this reason and for compactness and convenience in rolling and wrapping, it is customary to strip a layer of soiled or fiber-impregnated cotton from the outside surface of samples and to pull away straggling tufts from other edges. This is referred to as trimming or "dressing" the sample.

Although a few of the buyers that were interviewed said that samples should not be trimmed because the buyer should be given an opportunity to see all the cotton making up the sample drawn, most buyers thought that samples should be trimmed to the extent of removing all weather stain and damage. The trimming of cotton samples was found to be practiced in all of the States and at 95 percent of all compresses and warehouses visited (table 5). Samples drawn by plugging usually require little or no trimming or dressing, except on the outer surface. Attention is called to the fact that the rules of some trade organizations specify that samples shall not be trimmed.

Rolling the Sample.- The samples taken from the top and bottom sides of a bale of cotton should be so rolled and tagged (1) that correct judgment concerning the grade and staple of the cotton in the bale, based on these

samples, is facilitated; and (2) that there can be no doubt concerning the identity of the bale from which the samples were drawn.

Table 5.- Prevalence of the practice of trimming cotton samples at compresses and warehouses visited, by States, 1933

State	Compresses and warehouses visited	Percentage where samples were trimmed
	Number	Percent
Total	148	95.3
Alabama	13	100.0
Arkansas	12	100.0
Georgia	23	100.0
Louisiana	14	92.9
Mississippi	7	100.0
Missouri	2	100.0
North Carolina	12	100.0
South Carolina	11	100.0
Tennessee	6	100.0
Texas	46	87.0
Virginia	2	100.0

At many of the compresses and warehouses visited it was found that there were no regulations governing the method of rolling samples, the sampler following any method convenient to him. At most compresses and warehouses, however, the samples from the top and the bottom sides of the bale were carefully rolled with the identifying coupon between them, and at nearly 7 percent of the compresses and warehouses it was customary to roll the sample from the bottom side of the bale on the outside of the combined sample (table 6). As previously stated, the sample drawn from the top side of the bale is sometimes rougher and often has shorter and more irregular layers of cotton than the sample from the bottom side of the bale. When this condition is noticeable, it is a valuable means of identifying the sample from the top side of the bale. Under such circumstances, samplers sometimes place the sample from the bottom side of the bale on the outside and roll from each end toward the center, but the usual direction for rolling samples is not from the ends inward toward the center, but from one end to the other. Samples for certification according to the United States Cotton Futures Act are laid flat on sample paper and rolled inside the paper.

At one-half of the compresses and warehouses visited it was found to be customary to roll samples with the inside surfaces together (table 6). This practice was followed extensively in Alabama, Texas, South Carolina, Mississippi, and Virginia. At about 5 percent of the compresses and warehouses, the outside surfaces of the samples were rolled together; and at about 5 percent, the inside surface of one of the samples was rolled against the outside surface of the other.

Table 6.- Prevalence of various methods of arranging cotton samples for rolling at compresses and warehouses visited, by States, 1933

State	Compresses and warehouses visited	Proportionate use of specified methods of arranging samples for rolling						
		Inside surfaces together	Outside surfaces together	Inside surfaces against outside surfaces	Inside surfaces together and top side out	Inside surfaces together and bottom side out	Outside surfaces together and bottom side out	No one method
	Number	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Total	148	49.4	2.0	4.7	0.7	4.0	2.7	36.5
Alabama	13	76.9	---	---	---	---	---	23.1
Arkansas	12	16.7	25.0	16.7	---	---	24.9	16.7
Georgia	23	34.8	---	---	---	---	---	65.2
Louisiana	14	35.7	---	7.1	---	---	---	57.2
Mississippi	7	28.6	---	---	---	28.6	---	42.8
Missouri	2	---	---	100.0	---	---	---	---
North Carolina	12	25.0	---	---	---	---	---	75.0
South Carolina	11	63.6	---	---	---	---	---	36.4
Tennessee	6	33.3	---	---	---	---	---	66.7
Texas 1/	46	71.7	---	4.3	2.2	8.7	2.2	10.9
Virginia	2	50.0	---	---	---	---	---	50.0

1/ At one compress, cut samples were taken from bottom side of bale only. However, basis for percentage is taken as 46 compresses.

Occasionally a sampler will draw a sample from the top side of the bale, trim it, and divide it by layers, mixing the layers several times so that the inside and outside surfaces of the sample cannot be distinguished. When the sample drawn from the bottom side of the bale has been given the same sort of treatment, the two samples are placed together with the coupon between them. This practice of mixing layers is decidedly undesirable, for there is a possibility that the bale is thickly plated and that the portion of the plate drawn will be so placed as to unduly affect classing. In most cases it is possible to identify the inside surface of a sample before it is trimmed, unless it has been pulled by hand and is not very deep. Other means of identification are found in the bagging stain or trash on the outside surface and the comparative shortness, narrowness, and roughness of the inside surface. As shown in table 7, employees at compresses are usually able to distinguish the inside surfaces of cotton samples from the outside surfaces, but are less able to distinguish the portion of the sample taken from the top of the bale from that taken from the bottom of the bale.

It is well to remember that the sample from the bottom of the bale may be composed, wholly or in part, of cotton from the previous bale ginned, as is not the case with the sample from the top side of the bale. If, as previously suggested, some means of permanently identifying the top and bottom sides of bales should be adopted, standardized practice with respect to rolling would enable the classer to know in every instance, which portion of the sample is from the bottom of the bale. The practice of rolling the sample from the bottom side of the bale (when the bottom can be identified) on the outside of the combined sample would aid the classer in determining which portion of the sample is most representative of the bale. This determination would be further facilitated by the practice of placing the inside surfaces of the two portions of the sample together (with the identifying tag between them). The results of this study indicate that this is the predominant method of rolling samples at compresses and warehouses, presumably because the outside surface is in most instances larger than the inside surface. This gives special protection to the inside surface, which is probably most representative of the major portion of the cotton in the bale.

Handling, Packing, and Care of Samples.- Cotton samples should be handled carefully after they are drawn in order to prevent loss of sand or other foreign matter therefrom or other changes that may affect their representative character. In some localities samples are left on top of the bales for varying lengths of time before they are wrapped, whereas in other localities it is customary to wrap samples as soon as they are cut. The practice of leaving samples on the top of the bales after they are cut is not a good one, for the humidity of the sample may be changed, and the color also may be changed to some extent by bleaching.

Samples taken from cotton that is to be certificated are rolled and wrapped in individual papers, which helps to keep the humidity and the color of the cotton as nearly constant as possible throughout the sample. At some of the inland compresses and warehouses in each of the States except Alabama, Arkansas, Tennessee, and Virginia, individual papers were used for the samples from each bale. In most instances, when a single method is used, the

Table 7.- Comparative ability to identify inside and outside surfaces of cotton samples and portions of sample from top and bottom of bale at compresses and warehouses visited, by States, 1933

State	Compresses and warehouses visited	Percentage of compresses and warehouses visited at which replies concerning ability to identify inside and outside surfaces of samples were--			Percentage of compresses and warehouses visited at which replies concerning ability to identify portions of sample from top and bottom of bale were--			
		Yes	No	At times	Yes	No	At times	Unable to say
	Number	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Total	148	89.2	10.8	---	25.0	52.1	10.1	12.8
Alabama	13	92.3	7.7	---	15.4	30.8	---	53.8
Arkansas	12	100.0	---	---	41.7	50.0	8.3	---
Georgia	23	95.7	4.3	---	21.8	43.5	---	34.7
Louisiana	14	50.0	50.0	---	7.1	71.5	21.4	---
Mississippi	7	100.0	---	---	57.1	42.9	---	---
Missouri	2	100.0	---	---	50.0	50.0	---	---
North Carolina	12	75.0	25.0	---	---	75.0	8.3	16.7
South Carolina	11	100.0	---	---	---	81.8	---	18.2
Tennessee	6	100.0	---	---	33.3	66.7	---	---
Texas	46	91.3	8.7	---	37.0	41.3	21.7	---
Virginia	2	100.0	---	---	---	100.0	---	---

samples are rolled and packed in a sack; in others, they are rolled and packed in a box or a basket (table 8). At 25.7 percent of the compresses and warehouses visited, sacks were used for handling samples; at 3.4 percent, a method was used whereby samples were pressed in rows upon sampling paper and wrapped, 50 samples to the bundle; and at 0.7 percent, a string was tied around the sample immediately after drawing, and it was given to the farmer (table 8).

Buyers seem to think that when samples are rolled very tightly and packed tightly in a bag, they remain representative of the bale for a long time. The use of a box or a basket allows light and air to strike the samples, possibly lessening their representativeness. The poorest method of all is that of merely tying the sample with a string, for the sample is thus continuously exposed to light and wind from the time it is cut.

Either boxes or baskets were used as containers for samples at 13.5 percent of the compresses and warehouses visited, being used most extensively in North Carolina, South Carolina, and Alabama. It seems worthy of note that in this area samples are usually drawn by hand and that little thought is given to the matter of appearance of the sample. The sack is the means most often specified in most other States. Sacks, boxes, and baskets are widely used because they cost less than wrapping paper.

Samples should be properly handled and cared for after they are drawn, not only to preserve their representativeness with respect to color, foreign matter, moisture content, and other characteristics, but to prevent the loss or misplacement of the identifying coupons.

Summary and Conclusions

The principal types of samples drawn from bales of cotton are (1) the plugged, or blocked, sample; (2) the sample that is cut on one edge only; (3) the sample that is pulled from the bale with a cotton hook; and (4) the sample that is pulled from the bale by hand.

At one-third of the 148 compresses and warehouses visited for the purpose of assembling data for this report, the knife was used for cutting one or more edges of cotton samples before drawing them from the bales, all samples drawn being either "plugged" or drawn by cutting into the bale on one edge only. These compresses and warehouses were located in Texas, Louisiana, Alabama, Arkansas, and Georgia. At 4 percent of the 46 compresses and warehouses visited in Texas, plugged samples only were drawn.

At 22 percent of the compresses and warehouses visited in the Cotton Belt, samples were drawn by cutting into the bale on one edge only, usually in the form of a crescent. This method was most used in Texas and Louisiana.

At 24 percent of the compresses and warehouses visited, particularly in the vicinity of the Mississippi Delta, the knife was used to cut the bagging, after which samples were pulled from the bales with a cotton hook.

Table 8.- Comparative use of various means employed for wrapping or other care of cotton samples at compresses and warehouses visited, by States, 1933

State	Compresses and warehouses visited	Individual papers	String	Box or basket	Sack	Sample paper	Two or more of means specified	Not specified
	Number	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Total	148	8.1	0.7	13.5	25.7	3.4	29.7	18.9
Alabama	13	---	---	15.4	7.7	7.7	46.1	23.1
Arkansas	12	---	---	---	33.3	---	33.3	33.4
Georgia	23	8.7	---	8.7	21.7	8.7	13.0	39.2
Louisiana	14	14.3	---	---	---	---	85.7	---
Mississippi	7	14.3	---	---	57.1	---	14.3	14.3
Missouri	2	50.0	---	---	---	---	50.0	---
North Carolina	12	8.3	---	75.1	---	8.3	8.3	---
South Carolina	11	9.1	---	45.4	9.1	9.1	9.1	18.2
Tennessee	6	---	---	---	16.6	---	50.0	33.4
Texas	46	8.7	2.2	4.3	45.7	---	23.9	15.2
Virginia	2	---	---	---	50.0	---	50.0	---

At 31 percent of the compresses and warehouses visited, after cutting the bagging only, samples were pulled from cotton bales by hand. This practice was most prevalent in North and South Carolina, Virginia, Georgia, and Alabama. No compresses or warehouses employing this method were found in Texas, Louisiana, Arkansas, or Missouri.

Ginning and baling practices are closely associated with sampling. The possibility of insufficient mixing of the load of seed cotton brought to the gin and of "plating" the bale with cotton from a previous load that is of different quality, are matters associated with ginning that sometimes affect materially the representativeness of samples.

Information furnished by buyers interviewed throughout the Cotton Belt indicates that about 13 percent of the cotton marketed in the United States in 1932-33 was two-sided, and 92 percent of the managers of compresses and warehouses visited indicated that the top and bottom sides of flat bales can be identified. As a rule, the top and bottom sides of a compressed bale can be identified only when it is known that the flat bale was placed in the press with the top side up.

Since buyers, as a rule, are unwilling to pay for cotton of two different qualities within the bale a price above that which the lower quality commands, farmers should benefit from a method of drawing and rolling samples that would indicate whether or not the lower quality represents the bulk of the bale or only a small part of it. Additional benefits would result from developments in ginning by which plated or two-sided bales might be obviated. If the identity of the two sides of a compressed bale as well as of a flat bale could be known from time of ginning throughout its existence as a bale, and if the rolling of samples were so standardized as to insure the identity of the two portions of the sample, the classer would be able to know, in all instances, which portion of the sample is from the top side, and therefore most representative of the bale.

It has been shown that most cotton bales are plated to some extent. Under present conditions, it is necessary in cutting a sample that the cut into the bale be sufficiently deep to insure representativeness in the sample; that is, that a thin plate will not unduly affect the representativeness of the sample after it is trimmed. If the plate is thick, or if the sample is thin, adequate representation of the bale may not be obtained.

Thick, uneven patches on cotton bales often prevent the drawing of a good sample.

Cotton samples are usually trimmed to a depth that will remove bagging stain and weather stain.

At one-half of the compresses and warehouses it was customary to roll the samples from the top and the bottom of the bale with the inside surfaces together, separated only by the identifying coupon. At several, care was taken to roll the cotton from the bottom side of the bale on the outside of the combined sample. Both of these practices are desirable and could well

be incorporated in any plan for standardized rolling of samples. They facilitate rolling and tend to give greatest protection to that portion of the sample that is likely to most nearly represent the bale. The classer would thus know that the portion of the sample rolled on the outside is the one that was taken from the bottom of the bale and may be affected by plating.

When samples are to be used again, they should be handled carefully and in such a way that the two portions of the sample are not changed from their original position in the sample.

The present method of wrapping samples in individual papers for certification is the best yet devised for this purpose, but this method is not often employed in wrapping other samples. Individual papers for single samples are useful for preserving their identity, but the cost of such papers is often prohibitive. Wrapping several samples carefully and completely in paper, excluding light and air insofar as possible, is another good method of preserving their representativeness. Probably the next best way is to put the samples in a sack. Using open boxes and baskets is less desirable.

Although managers of compresses and warehouses were usually familiar with only the method of sampling that was employed locally, cotton buyers were of the opinion that method of sampling affects cotton classing. Although only 3 percent of the 161 cotton buyers stated that method of sampling affects staple-length determination, 25 percent stated that it affects grade determination, and 65 percent stated that it has a psychological effect on classing through difference in appearance.

The hand-pulled sample is the smallest and thinnest of the four types, and it is drawn with the greatest difficulty, particularly from high-density bales.

The sample pulled by hook is rough in appearance with irregular edges. As a rule, some of the trash is missing from this type of sample, and the layers of fibers have been disturbed. This sample may be smaller than either of the cut samples, as the cotton cannot be pulled loose close to the bands. The rumpling effect of the hook is not so evident when the cotton sampled is longer than 1-1/8 inches in staple, as such cotton is naturally somewhat rough in appearance.

The sample cut on one edge only can be taken conveniently from high-density bales only when the bands are properly spaced. Although there is usually plenty of room between bands on flat bales for drawing a sample by making the crescent-shaped cut, there seems to be little reason for preferring this kind of sample to the plugged sample--it does not roll so easily and is more difficult to pack and store.

The results of this study indicate that plugging is the most desirable method of drawing samples from high-density bales. The plugged sample can be wider than other samples, for the edges can be cut close to the bands. Such samples are more attractive in appearance and are more compact. They

can be stacked better, and they are more easily rolled. Because they require comparatively little trimming, handling and classing are expedited. The trash seen on the edges of the plugged sample does not detract from its usefulness as a sample but makes it more truly representative of the bale.

EXTRACTS FROM STATE LAWS RELATING TO FALSE PACKING OF COTTON

Alabama.....Laws relating to Gins--General Acts of 1923--Act 376, Article 32, Section 12--"Any person who fraudulently packs, or bales, any cotton, by plating or otherwise, must, on conviction, be fined not less than fifty, nor more than five hundred dollars, and may also be imprisoned in the county jail, or sentenced to hard labor for the county, for not more than six months."

Arizona.....Revised Code of Arizona, 1928, Section 4823--"Increasing weight of goods sold in containers. Every person who in putting up in any bag, bale, barrel, or other package, any hops, cotton, wool, grain, hay or other goods usually sold in same by weight, puts in or conceals therein anything whatever, for the purpose of increasing the weight, with intent thereby to sell the goods therein, or to enable another to sell the same, for an increased weight, is punishable by a fine of not less than twenty-five dollars."

Florida.....Compiled General Laws of Florida, 1927, Section 7856--"False packing of provisions. Whoever fraudulently puts into any barrel, bale of cotton, cask or other package of sugar, rice, or pork, or any other article of provisions, any dirt, rubbish, or other thing, shall be punished by fine not exceeding one thousand dollars."

Georgia.....Penal Code, Vol. 6, 1914, Section 709--"Any person who shall put or cause to be put into any bale of cotton, vessel of sugar, rice, pork, beef, or other provisions, wool, or other article, prepared for market, any dirt, rubbish, or other thing, for the purpose of adding to and increasing the weight or bulk of said cotton, sugar, rice, beef, pork, or other provisions or things, shall be deemed a common cheat, and shall be punished by a fine equal to the value of the thing thus fraudulently packed or put up, and imprisonment and labor in the penitentiary for not less than one year nor more than five years. The bare possession or ownership of such commodities, so fraudulently packed or put up, shall not of itself authorize a conviction, where sufficient evidence of knowledge or privity on the part of the owner, or the person in possession, may not be produced on the trial."

Mississippi.....Mississippi Code, 1930, Section 837--"If any person shall fraudulently pack or bale any cotton, he shall, on conviction thereof, be fined not more than five hundred dollars, or imprisoned in the county jail not more than six months, or both."

New Mexico.....New Mexico Statutes, 1929, Section 81-205--"Plaiting bales. Each and every ginner and any officer, servant or employee of a corporation, person or gin company conducting the ginning business under the provisions of this act, or any other person, persons or corporation who shall fraudulently, wilfully or knowingly 'plait' or pack a bale of cotton, which is to say, who shall wilfully and knowingly place on the outside of said bale a better grade and quality of cotton than on the inside of said bale or who shall gin cotton when it is wet or who shall in the process of ginning said bale of cotton or thereafter add water or any foreign substance to said cotton shall be guilty of an offense hereunder."

South Carolina.....Code of South Carolina, 1932, Section 1280--"Fraudulent Packing of Cotton. Any person or persons convicted of knowingly or wilfully packing into any bag or bale of cotton any stone, wood, trash, cotton, cottonseed, water, or any matter or thing whatsoever, or causing the same to be done, with the intent and purpose of cheating or defrauding any person or persons whomsoever in the sale of such cotton, or who shall exhibit or offer for sale any bag or bale of cotton so fraudulently packed, at the time of the said exhibit, or offer for sale knowing the same to be so fraudulently packed, shall on conviction thereof, as aforesaid, be sentenced to pay a fine of not more than five hundred dollars nor less than twenty dollars and to be imprisoned for a term of not more than six months nor less than one month."

Tennessee.....Code of Tennessee, 1932, Section 11147--"Penalty for concealing iron, stone, etc., in bales of cotton or packages of tobacco. If the owner or superintendent of cotton gin or tobacco establishments of any kind shall place any wood, iron, rocks dirt, or other substance, into any bale of cotton, hogshead package of tobacco, when packed or baled, for the purpose adding to the weight thereof, or shall cause the same to be do by others, such person so offending shall be deemed guilty felony, and, upon conviction thereof, shall suffer imprisc in the penitentiary for a period not less than two nor mo five years, and shall also pay a fine of five hundred d

Texas.....Complete Texas Statutes, 1928, Article 5672--"Certi Guarantee. Whether or not a sample of the bale of ginned shall be requested and taken by the ginner, shall, nevertheless, place with each bale of cotto him a certificate of guarantee under his bond that process of ginning or thereafter, while the cotton possession of the ginner, no water or foreign subs nature had been placed with such cotton, with inten Such certificate shall bear the name and address for whom the cotton was ginned, the number of th books of the ginner, and the weight of the bale